

# Tweed Champ 5F1 (assembling the board)

## The Beginning of Great Tone -

In 1958, the Fender Champ with its 8" speaker and 5 watts of power became the "mother of great tone". By combining the new 12AX7 with a great circuit, it was as if the planets aligned and whispered to Leo Fender what the near perfect amp should sound like. He was listening because he built it.

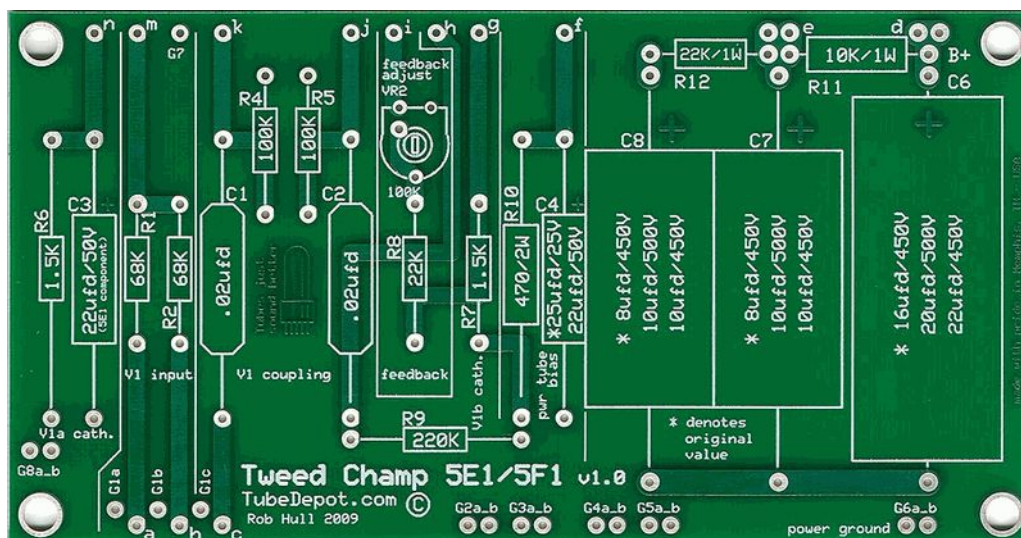
The tweed champ is one of my favorite amps because inside its diminutive size rests the heart of an entire world of music. From blues, to rock-a-billy; from rock-n-roll to soul; from country to jazz, this amp is capable of holding its own across a wide swath of musical history and genres. From humble consideration as a "beginner amp", this amp has become a standard bearer for what is cool about music.

## The PC Board -

This PC board was first and foremost designed to sound great. Along the way, I added a few extras to maximize the ability to customize. All of this is squeezed into a compact, easy to assemble package. This PC board layout closely follows the original point-to-point layout in order to duplicate any tone shaping created by component and wiring proximities. Additionally, with the over-sized traces and through-hole plating, this board will provide years of trouble free life.

This board is just solder, wire, and components away from becoming the heart of your perfect tweed champ style amp. The following descriptions outline the standard component installations and wiring arrangements. As well as some simple modifications to further improve the great tone of the basic circuit.

Photo 1



## Reviewing the Board -

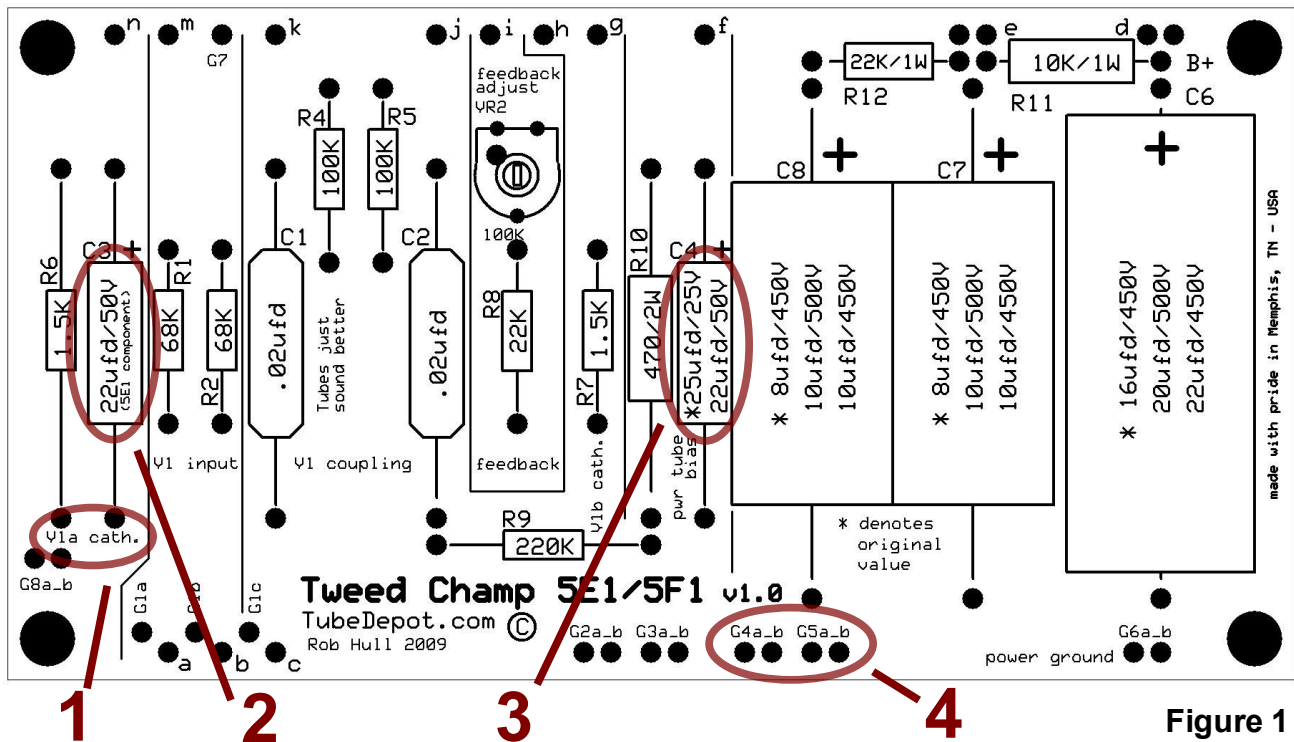


Figure 1

1. **Circuit stages are labeled on the board** - by labeling the individual stages, the components and their functions can be quickly identified.
2. **Separate components are labeled to build each amp versions** - There are few differences between the 5E1 and the 5F1 models. However, I've labeled the components necessary for building either (or both!) amp models!
3. **Vintage values are labeled along with the standard value choices** - Many of the capacitor values used in the 1950's through the 1970's are not standard values commonly found today. This is especially true of the electrolytic capacitors. When there are two values printed on the PC board with a single component, the value with the "\*" denotes the original vintage value. As far as performance, the amp will work equally well with either value.
4. **Multiple grounds and ground planes** - The design of multiple ground plans, each with multiple solder points, allows greater flexibility for grounding various parts of the circuit at different locations in the amp. In this way, it allows the lowest noise ground connections to be made, leaving an amp that is very quiet. And quiet is good.

In addition to the above features, here are a few other board goodies that I like.

- All solder traces are very wide in an effort to maximize signal transfer from stage to stage.
- All holes are through plated to insure solid connection with soldered components.
- The ground plane under the input resistors is extended to cover all of the input pads and components from board edge to board edge. This greatly lowers the noise floor.
- The feedback adjustment allows the amp to go from being a Gibson GA5 style response to a tweed champ style response at the turn of a potentiometer.

## **Schematic and Circuit Discussion -**

The schematic (figure 2) is for the Tweed Champ 5F1 model. The 5E1 model is a very similar circuit with only minor variations. Below I review the individual stages and explain the function of each component.

### **V1 input -**

The signal comes from the guitar and enters the amplifier through jacks J1 and J2. These are both standard SwitchCraft 12A jacks or equivalent. From the jacks, the signal carries through R1 (68K) and R2 (68K), developed across R3 (1M) and couples to pin 2 of V1 where it is amplified.

### **V1a cathode -**

Resistor R6 (1.5K) and capacitor C3 (22ufd) form the cathode self biasing circuit for the first half of V1 pin 3. The resistor determines the basic gain of this stage. The original 5F1 circuit did not have C3 installed however the 5E1 circuit did. The inclusion of C3 will increase not only the gain of V1 but also the bass response of the amp.

### **V1 coupling -**

From the output of the first half of V1 (pin1), the amplified signal is developed across the plate resistor R4 (100K) and coupled through capacitor C1 (.022ufd) to the volume control VR1 (1M potentiometer) on the front panel.

From the wiper of the volume control VR1, the signal is coupled directly to pin 7 of V1. The amplified output of the second half of V1 (pin 6) is developed across the plate resistor R5 (100K) and then coupled through capacitor C2 (.022ufd) to the control grid (pin 5) of V2. Resistor R9 (220K) references the V2 control grid, pin 5 to ground.

### **V1b cathode -**

Resistor R7 (1.5K) is the cathode biasing resistor for the second half of V1 connecting between pin 8 of V1 and ground. This resistor determines the basic gain of this stage.

### **Feedback -**

The junction of resistor R7 and V1 pin 8 is the location for the global feedback connection from the speaker through VR2 (100K trimmer pot) and R8 (22K). VR2 can be used to increase or decrease the feedback to the circuit. With one position of the pot (lowest resistance setting), the amp is cleaner and most like a stock Fender 5F1. With the other position of the pot (highest resistance setting), the amp has more overall distortion and is similar to the Gibson GA5 and Epiphone Valve Jr.

### **Power Tube bias -**

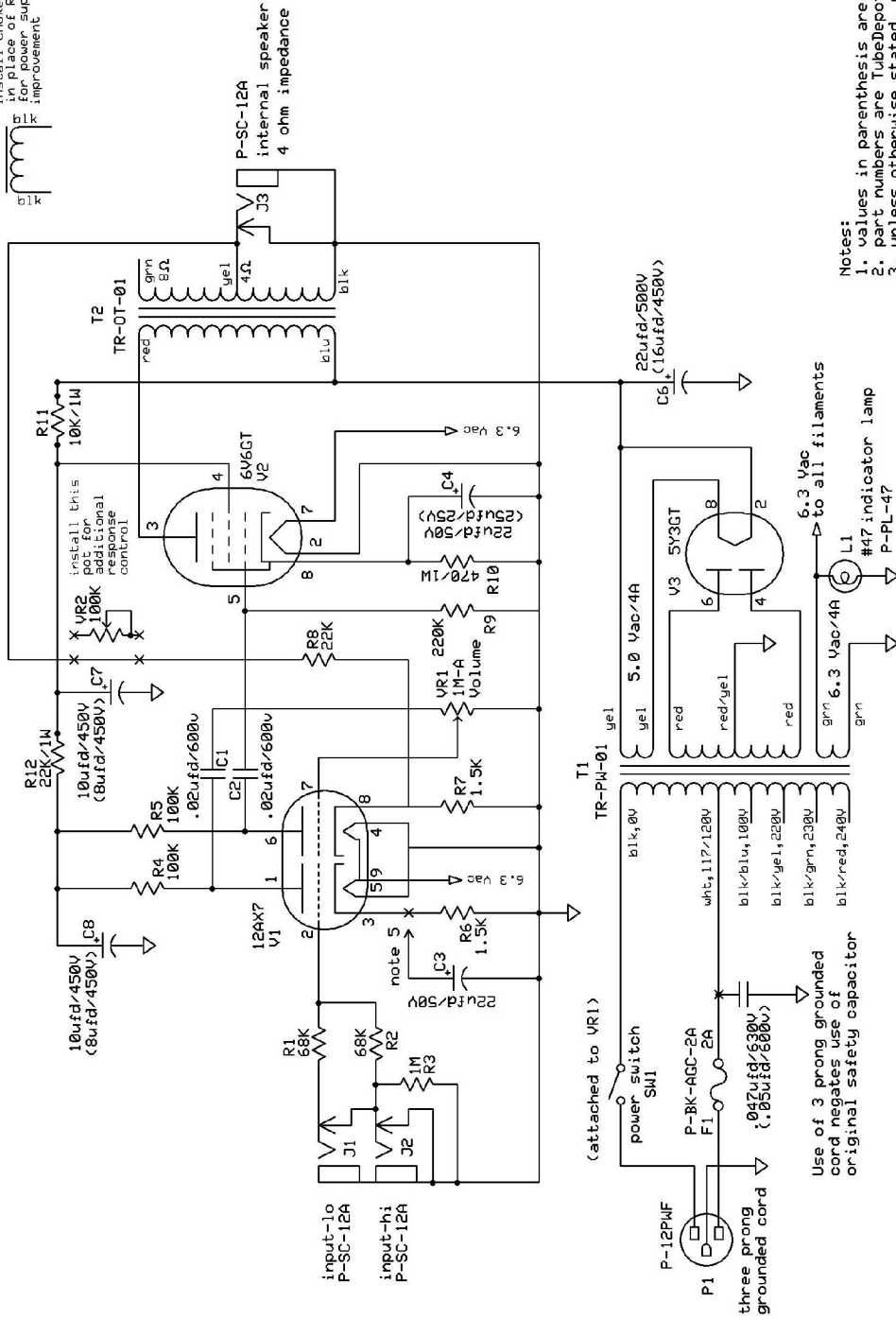
Resistor R10 (470 ohm / 2W) and capacitor C4 (22ufd) are connected between pin 8 of V2 and ground. These components create the cathode bias for V2.

### **Power supply filter -**

Capacitors C8 (10ufd / 450V), C7 (10ufd / 450V) and C6 (22ufd / 450V) along with R11 (10K / 1W) and R12 (22K / 1W) all work together as the power supply filter circuit. R11 and R12 form voltage dividers for the various stages through out the amp. C6, C7, and C8 act as the ripple filters to remove hum from these circuits.

Figure 2

TR-CK-02  
  
 install choke  
 in place of R11  
 for power supply  
 improvement



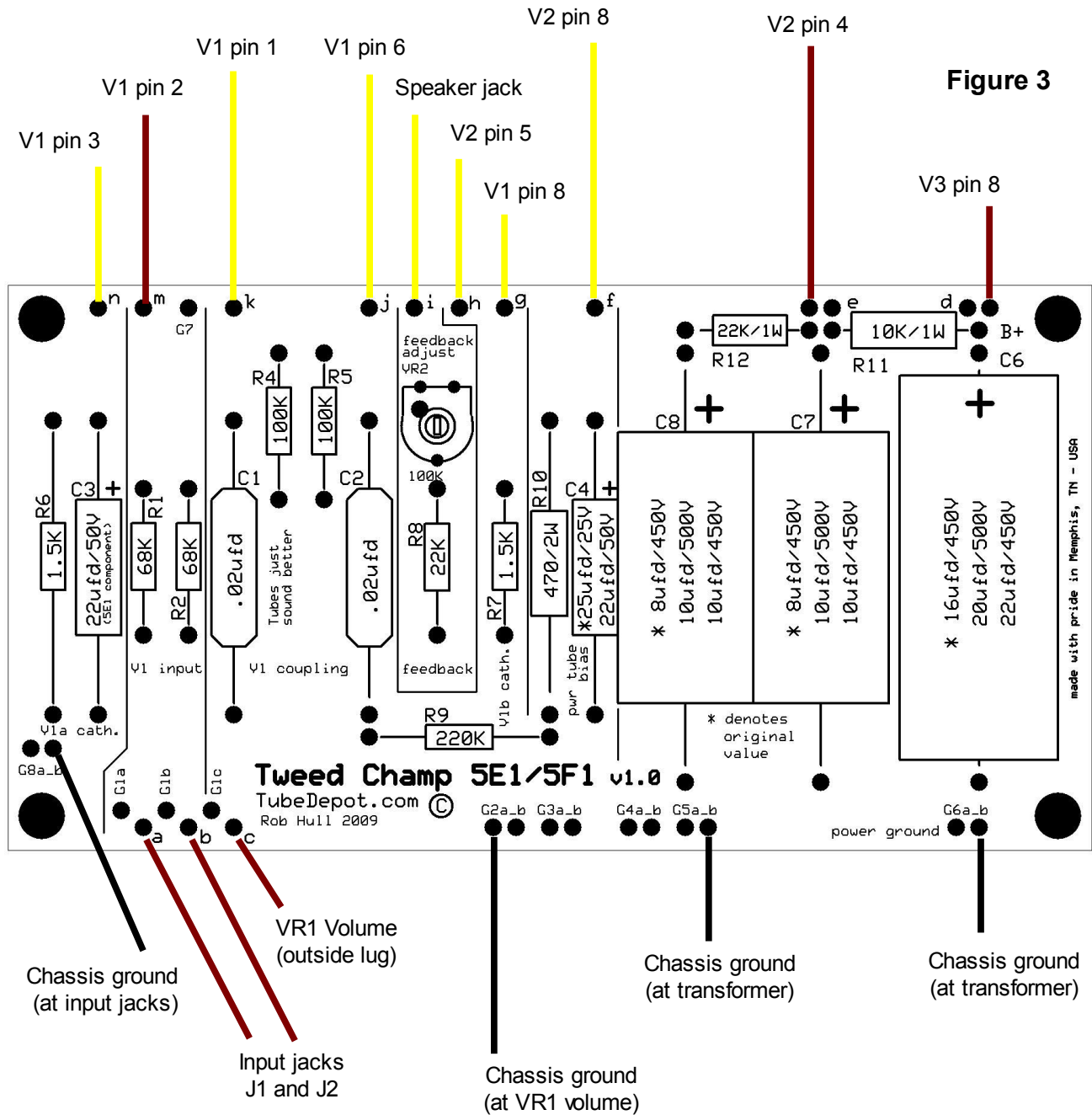
- Notes:
1. values in parenthesis are original values
  2. part numbers are TubeDepot.com stock numbers
  3. unless otherwise stated, resistors are 1/2W
  4. ground connections are to the chassis
  5. cathode capacitor installed for SEI

<b>TubeDepot.com</b>	
<b>Tweed Champ 5F1 - Schematic</b>	
R.M. Hull Jr.	Rev 1.0
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## Basic Wiring –

Below I've listed the recommended basic wiring to complete a standard Tweed Champ 5F1. The tube pin choices assume use of 12AX7 for V1, 6V6GT for V2, and 5Y3 for V3.

Your wiring may be slightly different based on your individual application and modification choices.



## Cool Modifications -

**C3 (cathode bypass cap)** – The installation of this cap will increase the gain of the first preamp as well as the low frequency response. If the amp sounds overly muddy after adding this cap, then this cap may be either removed or its value decreased. Experiment with values - 10ufd, 4.7ufd, 2.2ufd, 1ufd, or smaller.

**R6 (cathode resistor)** – The value of this resistor sets the level of gain of V1. A smaller value equals higher gain, a larger value equals less gain. The smallest value should not be less than 820 ohms, the highest useful value should probably be no more than 10K.

**C1 (interstage coupling capacitor)** – Decrease the value of this cap to reduce the amount of low end muddiness at extreme volume settings. Experiment with values .01, .0047, .002.

**C2 (interstage coupling capacitor)** – Decrease the value of this cap to reduce the amount of low end muddiness at extreme volume settings. Experiment with values .01, .0047, .002.

**R8 (feedback resistor)** – Increase this resistance to 100K and the point at which distortion begins to occur will appear sooner as the volume control is turned up. With this increase in gain, the noise floor will also get louder.

**R11 (voltage divider resistor)** – Replace this resistor with an inductor. This will give the amp more dynamics and bring the hum level lower. However, it also brings the B+ up higher so make sure all the filter caps are rated to 500 volts or better.

**Preamp tubes** – V1 can be practically any dual triode tube. 12AX7's were the designed choice however any tube with similar characteristics could be applied. The wiring descriptions from figure 3 were generated with the 12AX7 (and family of tubes) in mind.

**Output tubes** – This PC board can be used to drive not only 6V6 but EL84's and EL34's and 6L6's. The EL84 and its low drive signal requirements will distort the quickest. Where as the 6L6GC will have the highest headroom.

## Conclusion -

This board is a wonderful start to a fantastic amp. And with a little work, you will quickly hear why so many fellow musicians love its tone.

For a more thorough application of this board I recommend reviewing the following assembly manual.

[http://site.tubedepot.com/pdf/tweedchampkit\\_v5.pdf](http://site.tubedepot.com/pdf/tweedchampkit_v5.pdf)

Any questions or comments are welcomed and greatly appreciated.

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